was significantly reduced versus CG (€6,798 vs €6,954, p<0.001). PAP recipients had a significantly lower 3-year mortality rate versus CG (7.2% vs 10.9%, p<0.008; relative risk reduction 33.8%). **CONCLUSIONS:** SA patients with T2DM treated with PAP showed significantly reduced mortality and morbidity. Total COI was higher in PAP recipients versus CG in the first two years of follow-up, but during year 3 COI was significantly lower in the PAP group versus CG. In addition to the known advantages of PAP therapy in SA patients with T2DM (e. g. improved glycaemic control), PAP therapy may be beneficial from an economic perspective.

PDB41

ARE TOTAL HEALTH CARE EXPENDITURES IMPACTED BY A NEW DIABETES DIAGNOSTIC FACTOR: HBA1C?

Bhounsule P[1], Peterson AM[2]

[1]*University of the Sciences in Philadelphia, Philadelphia, PA, USA,* [2]*University of the Sciences, Philadelphia, PA, USA*

OBJECTIVES: To determine differences in total health care expenditures among general diabetics and newly diagnosed diabetics before and after HbA1c was implemented as the standard diagnostic factor. **METHODS:** Medical Expenditure Panel Survey-Household component 2009 and 2011 databases were used. Annual health care expenditures formed the dependent variable. Demographic factors, comorbidities, prescription drug costs, medical events and utilization variables for health care services like visits to office-based, outpatient and inpatient facilities, emergency rooms, home health care for 2009 and 2011 formed the independent variables. Patients diagnosed within the 2009 and 2011 years, were categorized into a dichotomous new diagnosis variable. General linear regression was conducted to compare predictors of total diabetes health care expenditures in 2009 and 2011. **RESULTS:** The mean total health care expenditure decreased in 2011 compared to 2009 among general diabetics {$10,901 (95%CI=$9,013-$11,836) vs $11,458 (95%CI=$10,715-$12,201)} and the newly diagnosed ones {$9,462 (95%CI=$6201-$12,721) vs $8,429 (95%CI=$6793- $10,064)}. Among general diabetics in 2009, total expenditures showed significant relationships with prescription drugs, emergency room, home health care, outpatient facility and physician services expenses (all values p<0.0001). The 2011 model was similar, but included associations between office-based provider visits (p<0.0001) and previous incidences of heart attacks (p=0.008). In 2009, among newly diagnosed patients, total expenditures were significantly associated with home health facilities expenditure (p<0.0001) as opposed to no association in 2011. In both years, prescription medication, emergency room and hospital inpatient facilities expenses contributed to spending. Visits to office-based and outpatient department providers, number of home-health provider days (all values p<0.0001) and hospital discharges (p=0.0011) impacted total expenditures in 2009 and 2011 respectively. **CONCLUSIONS:** Due to the many variables significantly affecting diabetes health expenditures, reduction in costs could not be solely attributed to the implementation of the HbA1c diagnostic criteria. Further research on cost-effectiveness of the HbA1c factor is warranted to establish any possible association.

PDB42

DIRECT COSTS OF DIABETES MELLITUS IN POLAND

Kawalec P

Jagiellonian University Medical College, Krakow, Poland

OBJECTIVES: The aim of this study was to assess the direct costs of ambulatory treatment associated with types 1 and 2 diabetes mellitus (DM) from the public payer perspective in Poland, and to explore the relative contribution of different cost components in the total direct cost of DM. **METHODS:** The estimates were based on reimbursement data from the years 2012 and 2013 provided by the public payer in Poland. Reimbursement costs of insulin, oral anti-diabetes drugs and monitoring strips were taken into account. Costs were presented in Polish zloty (PLN). **RESULTS:** Total reimbursement costs for the public payer of anti-diabetes treatment were 1.3 billion PLN in 2012 and 1.5 billion PLN in 2013, representing 19% and 21% of the total Polish reimbursement expenditures in 2012 and 2013, respectively. The highest component of anti-diabetes treatment costs was monitoring strips (645 million PLN in 2012 and 793 million PLN in 2013, 49% and 52%, respectively). Insulin costs (518 million PLN in 2012 and 583 million PLN in 2013) and anti-diabetes oral drug costs (144 million PLN in 2012 and 155 million PLN in 2013) constitute 38-40% and 10-11% of total reimbursement costs, respectively. Regarding insulin, human insulin had a larger share of the costs (60-62%) than insulin analogs (38-40%). Premixed human insulin (65-66% reimbursement costs) and premixed insulin analogs (47-52% reimbursement costs) represent the largest share of the reimbursement costs of human insulin and insulin analogs, respectively. Reimbursement costs of biguanides and sulphonylureas represent 49-54% and 40-44% of total reimbursement costs of oral anti-diabetes drugs, respectively. **CONCLUSIONS:** Total direct costs of diabetes mellitus treatment constitute a major part of reimbursement expenditures in Poland and are still growing. The main cost driver was reimbursement of monitoring strips, and the costs of insulin reimbursement were slightly lower.

PDB43

ESTIMATION OF COSTS ASSOCIATED WITH STROKE IN DIABETIC PATIENTS IN MADRID (SPAIN) USING A NEW SIMULATION MODEL

Sánchez-Piedra C, García-Pérez S, Sarría-Santamera A

Instituto de Salud Carlos III, Madrid, Spain

BACKGROUND: Diabetes (DM) has a relevant impact on health care budgets mainly due to its high prevalence and its chronic and acute complications. Isquemic stroke (IS) is one of the macrovascular complications associated with DM and its incidence increases with the presence of some risk factors such as hypertension and obesity. **OBJECTIVES:** Develop a model to predict future costs of DM in Spain. Estimate the increase in health care costs associated with potential IS in DM patients. **METHODS:** *Foro Gerendia* is an initiative constituted by health care professional, experts in DM management. A Markov model for DM was developed based on the opinion of *Foro Gerendia* and on previous works in this area. A 5-year primary care data registry of 22700 diabetic patients in Madrid was used to estimate transition probabilities in the model. Time horizon was 10 years. Prices were taken from the health care tariffs published by the Regional Health Service in Madrid and from Spanish literature. They were updated to 2013 price levels and adjusted to subsequent years by a 3% inflation rate. We used the perspective of the Regional Health Service in Madrid (public payer). **RESULTS:** The model included an acute event and 3 health states. The increase in total costs in 10 years was € 1,328 per DM patient (133 € per year). In patients with hypertension the costs increased by 1,519€ in 10 years (152 €); whereas the total increase in costs in patients with obesity was 1,535 € (153 €). **CONCLUSIONS:** IS has a relevant impact on the costs of management of DM. Hypertension and obesity increase these costs even further. Prevention of DM complications and an adequate control of risk factors can lead to cost savings for the management of DM. Understanding future costs of DM might be valuable for economic evaluations.

PDB44

ESTIMATION OF COSTS ASSOCIATED WITH CARDIOVASCULAR COMPLICATIONS OF DIABETIC PATIENTS IN MADRID (SPAIN) USING A NEW SIMULATION MODEL

García-Pérez S, Sánchez-Piedra C, Sarría-Santamera A

Instituto de Salud Carlos III, Madrid, Spain

BACKGROUND: High prevalence and chronic complications are key determinants of management costs of Diabetes Mellitus (DM). Given that DM affects more than 4 million people in Spain, the costs associated with this disease require an efficient management. Cardiovascular diseases are complications associated with DM with a major impact in health care budgets. **OBJECTIVES:** Develop a model to predict future costs of DM in Spain. Estimate the increase in health care costs in DM patients associated with potential cardiovascular diseases. We used the perspective of the Regional Health Service in Madrid (public payer). **METHODS:** *Foro Gerendia* is an initiative constituted by health care professional, experts in DM management. A Markov model for DM was developed based on the opinion of *Foro Gerendia* and on previous works in this area. A 5-year primary care data registry of 22700 diabetic patients in Madrid was used to estimate transition probabilities in the model. Time horizon was 10 years. Prices were taken from the health care tariffs published by the Regional Health Service in Madrid and from Spanish literature. They were updated to 2013 price levels and adjusted to subsequent years by a 3% inflation rate. **RESULTS:** Cardiovascular complications included in the model were ischemic heart diseases (acute myocardial infarction and angina) and heart failure with a total of 5 health states. The estimated increase in costs was € 1,080 per patient in 10 years (€ 108 per year). Considering an 8% prevalence of DM in Madrid, the increase in costs of DM due to cardiovascular diseases would be € 52 million per year. **CONCLUSIONS:** Cardiovascular diseases in DM patients have a relevant impact on health care expenditure. Prevention of cardiovascular complications can lead to significant cost savings for the management of DM. Understanding future costs of DM might be valuable in terms of budget allocation and economic evaluation.

PDB45

COST AND BURDEN OF HYPERCHOLESTEROLEMIA IN PORTUGAL

Gouveia M[1], Borges M[2], Augusto M[2], Caldeira D[2], Alarcão J[2], Pinheiro L[2], Sousa R[2], Fareleira F[2], Ascenção R[2], Costa J[3], Laires P[4], Fiuza M[5], Dias NC[5], Martins S[5], Belo A[5], Vaz-Carneiro A[2]

[1]*Católica Lisbon School of Business and Economics, Lisbon, Portugal,* [2]*Center for Evidence Based Medicine, Faculty of Medicine, University of Lisbon, Lisbon, Portugal,* [3]*Institute of Molecular Medicine, Lisbon, Portugal,* [4]*Merck Sharp & Dohme, Oeiras, Portugal,* [5]*Sociedade Portuguesa de Cardiologia, Lisbon, Portugal*

OBJECTIVES: Hypercholesterolemia is a risk factor for ciculatory diseases. This study estimates the impact of hypercholesterolemia on populations' health levels and its economic impact in Portugal. **METHODS:** The impact on health status is measured by the loss of life years adjusted for disability (DALYs - Disability Adjusted Life Years). The economic impact analysis includes two components. The first estimates the direct costs generated by hypercholesterolemia including consumption of health care, social support, and other associated costs (e. g. transport). The second estimates indirect costs, those related to the losses of productivity. The disease burden and the costs of illness attributable to hypercholesterolemia include also the complications attributable to this risk factor, namely ischemic stroke and ischemic heart disease. In order to estimate the attributable fractions to hypercholesterolemia (total cholesterol ≥200mg/dL or statin use) of the diseases considered, a microsimulation approach was employed by using Framingham equations on the national database (VALSIM). In a counterfactual scenario hypercholesterolemia was eliminated from these observations and the resulting proportional change in the probability of CV events was taken as the hypercholesterolemia attributable fractions. These fractions were used to estimate the contribution of hypercholesterolemia to the burden and the annual costs of the aforementioned circulatory diseases. **RESULTS:** 1,689 deaths can be attributed to hypercholesterolemia, which corresponds to 1.6% of the total deaths in Portugal in 2010. The DALYs resulting from disability and premature deaths caused by hypercholesterolemia in 2010 totaled 12,174. The estimated direct cost attributable to hypercholesterolemia in 2013 prices is €320 million (€32 million for in-patient care and €288 million for ambulatory care). Indirect costs generated by disability attributable to hypercholesterolemia add up to € 198 million. The overall costs of disease are therefore estimated at €518 million, about 0.3% of Portuguese GDP. **CONCLUSIONS:** In Portugal, we observed substantial burden and costs associated with Hypercholesterolemia.

PDB46

METFORMIN IN COMBINATION WITH DIPEPTIDYL PEPTIDASE-4 INHIBITORS OR SULFONYLUREAS IN THE TREATMENT OF TYPE 2 DIABETES: CLINICAL AND ECONOMIC IMPACT

Sicras-Mainar A[1], Navarro-Artieda R[2]

[1]*Badalona Serveis Assistencials, Badalona. Barcelona, Spain,* [2]*Hospital Universitari Germans Trias i Pujol, Badalona, Spain*

OBJECTIVES: To determine the clinical (compliance, metabolic control, hypoglycaemia and cardiovascular events [CVE]) and economic (resources and costs) impact of metformin in combination with dipeptidyl peptidase-4 inhibitors (DPP4-I) or sulfonylureas in patients with type 2 diabetes. **METHODS:** Design: Multicentre, observational retrospective study. Patients aged ≥ 30 years under treatment with metformin who initiated a second oral antidiabetic treatment in 2008-2009 were evaluated. Two study groups were established: a) metformin + DPP4-I, b) metformin + sulfonylureas. Main measures: comorbidity, metabolic control (HbA1c < 7%), compliance and complications (hypoglycaemia, CVE). Patients were followed for 2 years. The cost model considered direct (primary/specialised care) and indirect (productivity) health care costs. Statistical analysis: logistic regression models and ANCOVA, p <0.05. **RESULTS:** We recruited 1,405 patients (men age 67.1 years, 56.2% male) of whom 37% initiated a second treatment with DPP4-I and 63% with sulfonylureas. At 2 years follow-up, patients treated with DPP4-I showed better compliance (70.3% vs 60.6%), better metabolic control (64.3% vs 60.6%), and a lower proportion of hypoglycaemia (13.9% vs 40.4%) (p <0.05). The mean unit costs of the total adjusted costs were € 2,341 vs € 2,512, respectively; p = 0.038. Rates of CVE and renal failure were 3.7% vs 6.4%; p = 0.027. Vildagliptin was the most commonly used DPP4-I. **CONCLUSIONS:** Sulfonylureas were the most frequently used drugs for the treatment of diabetes. Patients treated with DPP4-I had better compliance and control of diabetes, with lower rates of hypoglycaemia and CVE, resulting in reduced health care costs.

PDB47

PATIENT-LEVEL ESTIMATES OF DIABETIC COMPLICATIONS ON DIRECT MEDICAL COST

Jiao FF, Lam CLK, Wong CKH, Fung CSC, McGhee S
The University of Hong Kong, Hong Kong Island, Hong Kong

OBJECTIVES: To estimate the impact of diabetic complications on immediate and long-term direct medical costs in Hong Kong. **METHODS:** A retrospective cohort study was conducted among 137,634 diabetic subjects from a territory-wide administrative database over six years (2008-2013). The trends of annual direct medical costs were analyzed by three groups: group 1) subjects without complications over study period; group 2) subjects with existing complications at baseline; and group 3) subjects developing new complications during follow-up. We employed panel data regression to investigate the impact of each diabetic complication on direct medical costs in the event year and subsequent years, adjusting for age and Charlson Comorbidity Score. **RESULTS:** We found 10,322 subjects with existing diabetic complications at baseline (January 1st, 2009), and 14,349 newly developed diabetic complications over 5 years. The annual direct medical costs increased from $US4,629 to $US15,585 in the new complications group, which is substantially higher than the modest rise in the no complication group (from $US1,157 to $US1,984). The annual direct medical cost of baseline case was $US1,062 (62 year-old, no complication, Charlson Comorbidity Score=0). After adjusting for age and comorbidity, compared to the baseline case, the multipliers of annual direct medical costs in the event year were: acute myocardial infarction (AMI) 10.61; other ischemic heart disease (IHD) 3.67; congestive heart failure (CHF) 8.46; stroke 10.17; sight threatening diabetic retinopathy (STDR) 3.41; blindness 2.78; end stage renal disease (ESRD) 12.16; peripheral vascular disease (PVD) 3.00; amputation: 3.48. The multipliers in subsequent years were: AMI 1.45; other IHD 1.32; CHF 1.86; stroke 1.37; STDR 2.16; blind 1.32; ESRD 1.86; PVD 1.42; amputation 1.32. **CONCLUSIONS:** There were wide variations in direct medical cost in event year and subsequent years across different major complications. These data would be useful for economic evaluations of diabetes prevention or treatment programs.

PDB48

COST OF DIABETES RELATED CHRONIC COMPLICATION IN SOUTH KOREA 2011

Yu J[1], Park S[2]
[1]*Sungkyunkwan University, Suwon, South Korea,* [2]*Handok Inc., Seoul, South Korea*

OBJECTIVES: This study aimed to analyze the direct medical cost of diabetes related micro- and macrovascular complications in Korean people with diabetes mellitus. **METHODS:** Using the Health Insurance Review & Assessment Service-National Patients Sample (about 1.3 million patients), which was a stratified sampling from the entire population (about 46 million persons) under the Korean national health security system (2011), estimation of direct medical cost complication for patients who have diabetes related chronic complications were performed. We used the 6th revision of Korean Standard Classification of Diseases (KCD-6) which had been developed with the reference of the 10th version of International Classification (ICD-10). All statistical analyses were performed using the Statistical Analysis System (SAS, version 9.3). **RESULTS:** The mean age of the subjects was 61.4 years, 52.1% were male and 47.9% were female. Of the 91,463 patients with DM, 20,584 patients (22%) had at least one microvascular or macrovascular complication, 70,879 patients (78%) had no complication. The average annual direct medical cost in patients who had no complications was 351,660 won in 2011. The average annual direct medical cost in patients who had microvascular complications such as retinopathy, nephropathy, neuropathy was 506,160 won, 1.4 times higher than without DM complications, who had macrovascular complications such as MI, CVA, ESRD was 1,362,928 won, 3.8 times higher than without DM complications. **CONCLUSIONS:** Diabetic complications have a substantial impact on the direct medical costs of DM patients. As the number of people with diabetes continues to rise, early detection of the disease and implementation of timely and appropriate therapeutic strategies could decrease the burden of diabetes chronic complications and also huge related expenditures.

PDB49

MEDICAL EXPENDITURE FOR PEOPLE WITH DIABETES IN URBAN EMPLOYEE BASIC MEDICAL INSUREANCE IN FUJIAN

Yu L[1], Zhang C[2]
[1]*Fujian Office, China Labour and Social Security News, Fuzhou, China,* [2]*Shenyang Pharmaceutical University, Shenyang, China*

OBJECTIVES: To estimate medical expenditure for people with diabetes covered by Urban Employee Basic Medical Insurance (UEBMI) in Fujian. **METHODS:** Claims data were extracted from UEBMIF database during 2012.1. 1 to 2012.12.31. People with diabetes were identified by keyword – diabetes. To estimate expenditures, we used Sum_All Medical method. Descriptive analyses were conducted by using EXCEL 2010. **RESULTS:** In 2012, one of the Fujian UEBMI database recorded claims data of 240079 patients, including 5953 with diabetes (2.48%), among which 68.81% were male and 91.03% were age over 50. The number of General Outpatient (GO)/Catastrophic Outpatient (CO)/inpatient with diabetes was 5196/4964/2325. GO/CO with diabetes visited physicians averagely 24.13/46.02 times, almost 60% of the visits happened in tertiary hospitals. People with diabetes each used inpatient services 1.70 times; the mean number of LOS was 16.52 days. Total Direct Medical Expenditure for people with Diabetes (TDMED) was CNY 132 million (16.33% of total direct medical expenditure); out-of-pocket spending accounted for 27.20%. GO/CO/inpatient medical expenditures were CNY 3824.16/7960.88/31365.25 per person and CNY 158.49/172.97/18396.62 per visit. Expenses for medicine was CNY 89 million (67.01% of TDMED), only CNY 17 million (13.03% of TDMED) was spent on anti-glycaemic medicine. 94.56% of people with diabetes took prescribed anti-glycaemic medicine, including OAD (88.34%), insulin (41.21%) and traditional Chinese medicine (23.13%). For CO, 47.26% of the visits were due to diabetes and the medical expenditure accounted for 43.40%. Among hospitalized people with diabetes, only 10.68% of their primary diagnoses were diabetes. Inpatient with diabetes whose primary diagnoses were diabetes consumed less health care resources (average LOS/medical expenditure per person/medical expenditure per visit) than those whose primary diagnoses were diabetic complications or other diseases (15.47days/CNY 14567.57/CNY 12481.90 vs. 16.65days/CNY 27666.67/CNY 19161.66). **CONCLUSIONS:** Diabetes, as one of the major chronic diseases, consumed a large amount of medical resources in Fujian. Majority of direct medical expenditure were spent on treating diabetic complications and other diseases.

PDB50

INDIRECT COSTS OF DIABETES MELLITUS (DM) FROM THE PERSPECTIVE OF THE SOCIAL INSURANCE INSTITUTION (ZUS) IN POLAND

Kawalec P
Jagiellonian University Medical College, Krakow, Poland

OBJECTIVES: The aim of this study was to assess the indirect costs associated with types 1 and 2 diabetes mellitus (DM) from the perspective of the Social Insurance Institution (ZUS) in Poland. **METHODS:** The estimates were based on data from the year 2012 concerning absence from work due to the illness (sick leave) the amount of short term disability, the sufferers of which claim rehabilitation benefit, and the amount of permanent (or long term) disability, the sufferers of which claim disability pension. Costs were presented in Polish zloty (PLN). **RESULTS:** Total indirect costs of DM types 1 and type 2 in the year 2012 in Poland were 59 013 912 PLN and 66 597 701 PLN, respectively. The highest component of indirect costs of DM type 1 was sick leave (61%). Long and short term disability costs constitute 28% and 11% of total indirect costs of DM type 1, respectively. A slightly different situation was reported in the case of type 2 diabetes: long term disability costs were only 1% of total indirect costs, and short term disability had a slightly larger part of indirect costs (less than 5%). The highest component of indirect costs of DM type 2 was sick leave (95%). One sick leave of a person with types 1 or 2 diabetes generated a cost of lost productivity equal to 1 771 PLN or 1 585 PLN, respectively. The cost of disability pension per one person was higher than rehabilitation benefit, and equalled 41 398 PLN compared with 17 249 PLN (the average value of one short and long term benefit payment was the same for both types of diabetes). **CONCLUSIONS:** DM in Poland generated high indirect costs. The main component was sick leave; rehabilitation benefit and disability pension generated much lower costs for Social Insurance Institution.

PDB51

KEY COST DRIVERS OF TYPE 2 DIABETES MELLITUS: AN INTERNATIONAL LITERATURE REVIEW

Villoro R1, Zozaya N[1], Hidalgo A[2], Oliva J[2], Rubio M[3]
[1]*Weber Economía y Salud, Madrid, Spain,* [2]*University of Castilla La Mancha, Toledo, Spain,* [3]*Sanofi, Barcelona, Spain*

OBJECTIVES: Type 2 Diabetes Mellitus (T2DM) is a worldwide prevalent chronic disease, related to high morbidity and mortality, and to significant socioeconomic costs. However, the magnitude of cost varies significantly among empirical studies. The objective of this literature review is to identify the main drivers that influence the costs of T2DM. **METHODS:** We searched relevant databases for studies estimating T2DM costs, published in English and Spanish in the USA and Europe (1995-2014). Search terms included "diabetes", "costs", "burden", and "economic impact". No exclusion was made based on study design. Cost drivers and differences in methodologies across studies were identified. **RESULTS:** A total of 25 papers were included out of 618 relevant titles identified. Costing methodologies and cost drivers vary significantly causing important variations in results. The main difference in methodology refers to estimating T2DM costs versus the costs of people living with T2DM, which include all direct sanitary costs -whether directly related to T2DM or not- and may increase total costs by up to 74%. Direct sanitary costs range between 40% and 75% of total costs depending partially on whether productivity losses and caregiving are considered. The relative weight of hospitalizations range between 20% and 60% of sanitary costs depending on the categories included. Pharmacologic costs range between 13% and 46%, which include antidiabetic drugs and treatments for complications derived from poor control. Optimal glycemic control reduces costs but is not always considered in the studies. Microvascular and/or macrovascular complications and hypoglycemic events increase total cost per patient. **CONCLUSIONS:** Differences in costing methodology, the type of cost categories included in the analysis and the source of data greatly influence the results of the studies and impede reaching accurate conclusions regarding the cost of T2DM. Designing standardized costing methodology guidelines would help future studies estimate the real burden of T2DM.